UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte JOSEPH A. KWAK

Appeal No. 2005-2394
Application No. 09/939,410

HEARD: NOVEMBER 16, 2005

Before KRASS, DIXON, and BARRY, Administrative Patent Judges.
KRASS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the final rejection of claims 1-31.

The invention pertains to wireless communication systems. In particular, it relates to a modification to such systems by employing a physical layer (PHY) automatic repeat request (ARQ) scheme. Conventionally, in a layer 2 ARQ, data blocks unsuccessfully transmitted to subscribers are buffered and retransmitted from layer 2. The data blocks stored in layer 2, typically large, are transmitted for high signal-to-noise ratio reception, are received with a low block error rate, and are infrequently retransmitted. The layer 2 ARQ signaling is also typically slow and requires large buffers and long retransmission intervals.

As an improvement over this conventional system, the instant invention, at the transmitter, receives data and formats the received data into packets having a particular encoding/data modulation. The transmitter contains n channels for transmitting the packets and retransmitting the packets in response to not receiving a corresponding acknowledgment for a given packet. An adaptive modulation and coding controller in the transmitter collects retransmission statistics and adjusts the particular encoding/data modulations using the collected statistics.

On the receiver end, the receiver receives the packets and, through an n-channel hybrid ARQ combiner/decoder, combines packet transmissions, decodes packets and detects packet errors. An acknowledgment for each packet is transmitted from the receiver if that packet has an acceptable error rate. An in-sequence delivery element delivers acceptable packets to higher layers.

Representative independent claim 1 is reproduced as follows:

1. A method for adjusting data modulation in a wireless communication system, the method comprising:

receiving data at a transmitter for transmission to a receiver;

formatting the received data into packets for transmission to the receiver, each packet having a particular encoding/data modulation;

transmitting the packets to the receiver;

receiving the packets at the receiver;

for each received packet, generating and transmitting an acknowledgment at the physical layer using a fast feedback channel, if the received packet has an acceptable error rate;

retransmitting that received packet at the transmitter, if an acknowledgment for that packet is not received;

collecting retransmission statistics; and

adjusting each particular encoding/data modulation using the collected retransmission statistics; wherein if the collected retransmission statistics indicate a low number of retransmissions, a higher capacity encoding/data modulation scheme is selected as the particular encoding/data modulation and if the collected retransmission statistics indicate a high number of retransmissions, a lower capacity encoding/data modulation scheme is selected as the particular encoding/data modulation.

The examiner relies on the following references:

Haartsen	6,021,124	Feb 01, 2000
Agee	6,128,276	Oct. 03, 2000
Schramm et al. (Schramm)	6,208,663	Mar. 27, 2001
Yonge, III et al. (Yonge)	6,522,650	Feb. 18, 2003 (filed Aug. 04, 2000)
Sipola	6,529,561	Mar. 04, 2003 (filed May 10, 2001)

Claims 1, 2, 4-6, 13, 14, and 16-18 stand rejected under 35 U.S.C. §102 (e) as anticipated by Schramm.

Claims 3, 7-12, 15, and 19-31 stand rejected under 35 U.S.C. §103. As evidence of obviousness, the examiner offers Schramm and Agee with regard to claims 3 and 15, and Sipola and Schramm with regard to claims 7, 8, 11, and 12, adding Agee to this latter combination with regard to claims 9 and 10. With regard to claims 19-21 and 29-31, the

examiner offers Haartsen and Schramm, adding Sipola with regard to claims 24-28, but adding Yonge with regard to claims 22 and 23.

Reference is made to the briefs and answer for the respective positions of appellant and the examiner.

OPINION

Turning, first, to the rejection based on 35 U.S.C. §102(e), a rejection for anticipation under section 102 requires that the four corners of a single prior art document describe every element of the claimed invention, either expressly or inherently, such that a person of ordinary skill in the art could practice the invention without undue experimentation. In re Paulsen, 30 F.3d 1475, 1478-79, 31 USPQ2d 1671, 1673 (Fed. Cir. 1994).

It is the examiner's position, with regard to independent claim 1, that Schramm, in Figures 3 and 5, discloses the claimed method for adjusting data modulation in a wireless communication system comprising a transmitter (radio base station (RBS) 22) for receiving data, formatting the received data into packets (citing column 5, lines 46-58), transmitting the packets (citing column 5, lines 25-45) and receiving them at a receiver (citing mobile stations 12), generating and transmitting an acknowledgment at the physical layer using a fast feedback channel, if the received packet has an acceptable error rate (citing column 7, lines 39-53), retransmitting a packet, if an acknowledgment for that packet is not received (citing column 7, lines 39-53), collecting retransmission statistics (citing column 7, lines 1-13), and adjusting each particular data modulation using the collected retransmission statistics (citing column 7, lines 1-38), wherein if the collected retransmission statistics indicate a low number of retransmissions, a higher capacity

encoding/data modulation scheme is selected as the particular encoding/data modulation and if the collected retransmission statistics indicate a high number of retransmissions, a lower capacity encoding/data modulation scheme is selected as the particular encoding/data modulation (citing column 7, line 1, through column 8, line 22, and claim 27).

Appellant argues that all Schramm is disclosing at column 7, lines 1-12, is that after transmission of a block has failed a specified number of times, the block is transmitted using an alternative scheme having an improved noise and/or interference rejection. It is appellant's position that counting a number of failed attempts of retransmitting a given packet does not constitute "collecting retransmission statistics."

We disagree with this argument of appellant. Clearly, the broad claim recitation of "collecting retransmission statistics" is met by Schramm's disclosure of counting a number of failed attempts at retransmission since the number of retransmission failed attempts is also a "statistic" even if not the statistic appellant had in mind.

Next, appellant argues that the instant invention "adjusts to a higher capacity encoding/data modulation scheme in response to a low number of retransmission statistics" (principal brief-page 6), which allows for the system to achieve an optimum encoding/data modulation scheme using retransmission statistics. It is appellant's contention that applying Schramm to a low retransmission environment "would result in either no change to the scheme (the threshold not being exceeded) or, ironically, to a lower capacity scheme (if a retransmission is required and the threshold is exceeded)" (principal brief-pages 6-7). Therefore, concludes appellant, Schramm "would never move to a higher capacity scheme based on acknowledgments or negative acknowledgments" (sic, principal brief-page 7).

Again, we disagree with appellant. As we read Schramm's disclosure, at column 7, lines 1-13, when the "quality of the connection is not sufficient for the current FEC coding and/or modulation scheme," an alternative scheme for retransmission processing is selected. That alternative scheme is given as QPSK modulation, for example, and this is "designed to have improved noise and/or interference resistance." Previously, at column 2, lines 23-40, for example, Schramm explains that QPSK is an exemplary "lower level modulation" but that, by way of comparison, 16QAM is a higher level modulation (lines 24-26), and that "16QAM provides twice the user bit rate of QPSK..." (lines 39-40).

Putting this disclosure together, it appears to us that what Schramm is disclosing at the cited portion of column 7 is that when the quality of the connection at 16QAM is not sufficient, i.e., there are a higher number of retransmissions because the quality of the connection is insufficient, then the alternative scheme of QPSK, a lower capacity encoding/modulation scheme than 16QAM, is employed. Clearly, the inverse of this is also true, so that where there is a lower number of retransmissions indicated, the modulation scheme selected is the higher capacity 16QAM modulation scheme. Thus, in our view the language of instant independent claim 1 is met by Schramm.

Appellant further argues that "the present invention uses the retransmission statistics to adjust the encoding/modulation scheme. This is clearly different to (sic, from?) resetting the scheme for each block of Schramm, which is performed automatically after a successful transmission" (principal brief-page 7).

We do not find this argument to be persuasive of patentability since Schramm does use retransmission statistics to adjust the encoding/modulation scheme. As pointed out supra with regard to column 7, the selection of an alternative scheme is based on the

quality of the connection which, itself, is based on the number of requests for retransmission. If there is a large number of retransmission requests, then, clearly, the connection is insufficient and an alternative encoding/modulation scheme is selected.

Appellant also argues that representative claim 1 recites using a "fast feedback channel" for acknowledgments, which is not discussed in Schramm. Appellant points out that the use of such a channel "allows for fast acknowledgment and fast adaptation of the encoding/modulation scheme to the channel conditions as reflected by the fast accumulting retransmission statistics" (principal brief-page 7).

The examiner asserts that Schramm discloses a "control channel" used for signaling on the uplink (ACK/NAK) at column 6, lines 64-67, and that since a control channel is a separate channel from the data channels, it is a fast feedback channel (answer-page 17).

Again, we view the examiner's explanation as reasonable, since column 6, lines 64-67, indicates that a control channel is to be used for retransmission, which, obviously, may be used for acknowledgments. Since this control channel is separate from a data channel, and "fast" is a relative term, undefined by the instant claims or appellant, it is reasonable to find that Schramm suggests that acknowledgments may be transmitted on a fast feedback channel, as claimed.

Perhaps appellant may have been able to make an argument to convince us of the nonobviousness of this claimed subject matter, but, for whatever reason, appellant makes no such argument. Appellant merely generally alleges that Schramm does not disclose the use of a fast feedback channel for acknowledgments, but does not respond to the examiner's specific position.

Accordingly, since we find that the examiner has set forth a reasonable case of anticipation, pointing to disclosure within Schramm corresponding to each and every one of the claimed elements, and appellant has not convinced us of any error in the examiner's reasoning, we will sustain the rejection of claims 1, 2, 4-6, 13, 14, and 16-18 under 35 U.S.C. §102 (e). Claims 2, 4-6, 13, 14, and 16-18 fall with independent claim 1 in accordance with appellant's grouping of the claims.

Turning to the rejection of claim 3 under 35 U.S.C. §103, the examiner relies on Agee, in combination with Schramm, for the teaching of transmitting packets using an OFDMA air interface in which frequency subchannels in an OFDMA set may be selectively nulled. Specifically, the examiner points to column 4, line 19, through column 5, line 40, of Agee, for a radio communication method that is compatible with discrete multiple tone and orthogonal frequency-division multiplex-like frequency channelization techniques.

The examiner concludes that it would have been obvious to add a method that transmits packets using an OFDMA air interface, as suggested by Agee, in the method of Schramm "in order to allow stationary and linear channel distortion to be modeled as an exactly multiplicative effect on the transmit spreading code" (answer-page 7).

Appellant's response is to acknowledge that Agee mentions OFDMA in passing in columns 4-5, but appellant contends that it does not disclose[1] nulling sub-channels or, in particular, the nulling of the sub-channels as the adjusting of the modulation and coding scheme (principal brief-page 7).

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[1]We assume that appellant meant to say that Agee does *not* disclose these features, but page 7 of the principal brief actually recites that "[Agee] does disclose nulling sub-channels or, in particular, the nulling of the sub-channels as the adjusting of the modulation and coding scheme..."

We disagree with appellant. First, we note that appellant does not argue the noncombinability of the references, but, rather, only that Agee fails to disclose nulling sub-channels or, in particular, the nulling of the sub-channels as the adjusting of the modulation and coding scheme. Next, we note that, contrary to appellant's argument, claim 3 does not require the nulling of sub-channels as the way to adjust the modulation and coding scheme. The claim merely states that packets are transmitted using an OFDMA air interface and the FEC encoding/data modulation adjusting is performed *in addition to* selective nulling of subchannels in an OFDMA set. Having something performed *in addition to* selective nulling of subchannels does not have the same meaning as having that something, viz., adjustment of encoding/data modulation, performed via selective nulling of subchannels, as appellant appears to now be arguing. Since the examiner has reasonably shown that Agee discloses the transmitting of packets by an OFDMA air interface and the selective nulling of subchannels, with a reasonable explanation as to why the skilled artisan would have modified Schramm with these teachings of Agee, and appellant has offered nothing but merely to deny that Agee discloses nulling sub-channels, without further explanation, we will sustain the rejection of claim 3 under 35 U.S.C. §103, as well as the rejection of claims 9, 15, and 29, which fall with claim 3, under 35 U.S.C. §103.

Finally, we turn to the claims of Group 3, viz., claims 4, 10, 16, and 30, with claim 4 being reresentative. With respect to these claims, appellant contends that while Schramm is cited as disclosing the use of a single carrier-frequency division equalization (SC-FDE), Schramm does not even mention SC-FDE, except that "the present invention is readily applied to all types of access methodologies" at column 4, lines 51-53.

We will sustain the rejection of claims 4, 10, 16, and 30 under 35 U.S.C. §103 because appellant's argument is merely a general allegation that Schramm does not disclose what the examiner contends that it discloses. However, the examiner, reasonably in our view, contends that Schramm's general recitation of his invention being applicable "to all types of access methodologies" is also applicable to SC-FDE, and appellant has offered absolutely no explanation as to why the examiner's allegation is unreasonable or erroneous.

We have sustained the rejection of claims 1, 2, 4-6, 13, 14, and 16-18 under 35 U.S.C. §102 (e) and we have sustained the rejection of claims 3, 7-12, 15 and 19-31 under 35 U.S.C. §103. Accordingly, the examiner's decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a)(1)(iv) (effective Sept. 13, 2004).

AFFIRMED

ERROL A. KRASS
Administrative Patent Judge

JOSEPH L. DIXON
Administrative Patent Judge

LANCE LEONARD BARRY
Administrative Patent Judge

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VOLPE AND KOENIG, P.C.
DEPT. ICC
UNITED PLAZA, SUITE 1600
30 SOUTH 17TH STREET
PHILADELPHIA, PA 19103